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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/767,230	01/22/2001	Andreas H. Hielscher	0887-4150US1	1470
27123	7590	11/14/2005	EXAMINER	
MORGAN & FINNEGAN, L.L.P.			JUNG, WILLIAM C	
3 WORLD FINANCIAL CENTER			ART UNIT	
NEW YORK, NY 10281-2101			PAPER NUMBER	

3737

DATE MAILED: 11/14/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/767,230	<b>Applicant(s)</b> HIELSCHER ET AL.	
	<b>Examiner</b> William Jung	<b>Art Unit</b> 3737	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 25 April 2005.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-60 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-60 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Response to Arguments***

1. Applicant's arguments filed April 25, 2005 have been fully considered but they are not persuasive.

After further consideration of the Applicant's request for reconsideration, Examiner respectfully disagrees with the applicant's argument. As presented by the applicant in remarks pages 21-24, the applicant points out the difference between claimed invention and Schotland's disclosure where Schotland fails to disclose time-independent diffusion equation of radiative transfer. However, Schotland's diffusivity is depend on both time and optical absorption coefficient, i.e. scattering characteristics of the path medium. In addition, the claims languages in independent claims 1, 28, 29, and 56-60 do not disclose that the predicting the radiative transfer is restricted to time independent function. Assuming that the claim is time-independent than the predictive nature of the diffusivity becomes static as disclosed by Schotland (col. 6, line 63 - col. 7, line 21).

Secondly, Schotland discloses the nonlinear characteristics of optical property where the optical properties are expressed in function of optical diffusivity (equation 2) where it is clearly nonlinear. In addition, claims 1, 28, 29, and 56-60 do not disclose specific nonlinearity of the optical properties.

Finally, the initial guessing of the medium's optical properties based on the gradient of the objective function is disclose in col. 10, lines 33-45 where Schotland clearly disclose CW source 620 radiating object 610 with scattering medium where the radiation emanating from object 610 is approximated to measure both modulus and phase.

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Therefore, Examiner maintains the rejection from previous office action dated October 21, 2004, which is restated below.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 9-15, 19-23, 28, 29, 37-43, 47-51, and 56-60 are rejected under 35 U.S.C. 102(b) as being anticipated by *Schotland* (US 5,787,888).

***Claims 1, 15, 28, 29, and 43:*** Schotland anticipates all claimed features in claims 1, 28, and 29. Schotland discloses a method and a system for reconstructing an image of a scattering medium comprising a source directing energy into the scattering medium at source location on the scattering medium, a detector for measuring the energy emitted from the scattering medium at a detector location on the scattering medium, an internal properties of the scattering medium, means for using an equation of radiative transfer to predict and generate a function of radiative diffusion through the scattering medium, means for generating gradient of the objective function, means for modifying the properties of the scattering medium based on the gradient of the objective function, and means for generating an representation of the internal properties of the scattering medium. Schotland further includes method where properties including at least one of scattering coefficient, an absorption coefficient, an anisotropy factor, and a scattering phase function (col. 4, line – col. 5, line 15; col. 5, line 66 - col. 6, line 14; col. 6, lines 33-62; col. 7, lines 38-54).

**Claim 56:** Schotland further discloses in addition to the system described above where the imaging includes spatial distribution of optical properties of tissue (col. 5, line 66 – col. 6, line 14).

**Claims 57-60:** Schotland discloses in figures 1 and 7 where the system described above includes computer processor 650, which executes computer codes 730 to obtain reconstructed images. More specifically, the computer codes include algorithms to carry out the means described above.

**Claims 9, 12, 37, and 40:** Schotland discloses that the radiative transfer is detected as the radiative source is diffused in scattering medium such as tissue. And the diffusion process of the scattering medium therefore is inherently a time dependent function.

**Claims 10, 11, 13, 14, 38, 39, 41, and 42:** Schotland discloses time independent equation of radiative transfer from equation (1) (col. 8, line 6), where the equation is a function of angle, and spatial position with scattering and absorption coefficient. In addition, Schotland discloses that the scattering phase is expressed as function of the angle (equation 40).

**Claims 19-22 and 47-50:** Schotland discloses a computational method where the objective function is minimized, which includes minimizing at least in one-dimensional line along a direction of the gradient (col. 11, line 29 – col. 12, line 8).

**Claims 23 and 51:** Schotland discloses that the method above includes energy near infrared energy (col. 10, lines 51-55).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 2-8, 16-18, 24-27, 30-36, 44-46, and 52-55 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Schotland* as applied to claim 1 above, and further in view of *Sevick-Muraca et al* (US 5,865,754).

Schotland substantially discloses all claimed features in claims 2-8, 16-18, 24-27, 30-36, 44-46, and 52-55. However, Schotland does not disclose or imply setting threshold (claims 2 and 30). In addition, Schotland does not anticipate boundary condition or iterative process to determine the predicted absorption coefficient (claims 3-8 and 31-36). Also, Schotland does not disclose comparison method and normalization to adjust the objective function of the energy.

**Claims 2-8 and 30-36:** Sevick-Muraca et al disclose fluorescence imaging method and system where the diffusivity of the radiative scattering is determined using threshold setting and iterative process to determine the predicted absorption coefficient (col. 4, lines 51-65; col. 6, lines 19-58; col. 9, lines 13-30).

**Claims 16-18, 24-27, 44-46, and 52-55:** In addition to disclosures above, Sevick-Muraca et al disclose comparison stage 240 to compare the predicted and measured energy iteratively, and normalizing the detected energy obtained as described by the Jacobian matrices shown in equations 7 and 8 (col. 9, line 13 – col. 10, line 28).

Therefore, it would have been obvious to one having an ordinary skill in the art at the time the invention was made to apply Sevick-Muraca et al's teaching described above to improve method and system of device such as Schotland's.

*Conclusion*

6. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to William Jung, Ph.D. whose telephone number is 571-272-4739. The examiner can normally be reached on Mon-Fri 8:30 AM to 5 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Brian Casler can be reached on 571-272-4956. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

WLS  
July 10, 2005

  
ELENI NANTIS-MERCADER  
PRIMARY EXAMINER